



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,047	02/02/2004	Kalin Spariosu	PD-02W202	1523
7590 John E. Gunther Raytheon Company P.O. Box 902 (E1/E150) El Segundo, CA 90245-0902			EXAMINER NGUYEN, PHILLIP	
			ART UNIT 2828	PAPER NUMBER
			MAIL DATE 05/18/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/771,047

Applicant(s)

SPARIOSU ET AL.

Examiner

Phillip Nguyen

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-17,19-29,31-40 and 42-57 is/are pending in the application.
- 4a) Of the above claim(s) 10 and 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-9, 12-17,19-29,31-40 and 42-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 11/03/2006.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-3, 5-9, 12-17, 19-29, 31-40, and 42-57 have been considered but are moot in view of the new ground(s) of rejection.

On April 25, 2007, Examiner contacted Mr. Benman and discussed about a proposed amendment to all of the independent claims so that the claims should include the structure of the spatial filter as described in the specification, page 6, lines 12-17, before the application is considered for allowance. However, applicant's representative preferred an Office Action that provides more detail regarding to the point of view of Examiner.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 8-9 and 12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim recites "wherein said fiber laser resonators differ in length by more than 1.4 centimeters" but the specification,

Art Unit: 2828

page 7, second paragraph, only supports a length of more than 1.5 centimeters. Claims 9 and 12 further depend on claim 8; therefore they lack enablement as well.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 5-7, 13-15, 19-20, 23-28, 46-47, 52-53 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran (US 20030063631).

With respect to claims 1, 52, and 57, Corcoran discloses the claimed invention, particularly in Fig. 8, a laser system comprising a plurality of fiber laser resonators (defined by the reflectors of both sides of the gain medium 14a-n); a high power pump source 12a-12n coupled to each of said fiber laser resonators; and a spatial filter (paragraph 0028) external to said laser resonators, said spatial filter adapted to combine plurality of laser beams 22a-22n output from said plurality of fiber laser resonators into a single output laser beam 34 except for said spatial filter further includes beam flattening optics. According to the specification of the present application, applicant provides collimating lenses pairs 20 as beam flattening optics and further discloses that beam flattening optics are well known in the art, and one skilled in the art with access to the present teachings may construct the array of beam-flattening optics 20 without

Art Unit: 2828

undue experimentation. Therefore it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide a beam flattening optics to the spatial filter in order to flatten the laser beams for more efficient spatial coherency.

With respect to claims 2-3, 13-15, 22, 46-47, Corcoran discloses the paragraph 0066 the fiber resonators using Nd:YAG and further suggest other solid-state can also be used in gain media 14. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide Er:YAG which is other solid-state gain medium and double clad fiber to provide more efficient internal reflection in the core of the fiber. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide an OPO to convert wavelength from the fiber laser resonators to eye-safe wavelengths.

With respect to claims 5 and 21, pump laser sources 12a to 12n are laser diodes (paragraph 0027).

With respect to claim 6, Corcoran discloses the claimed invention except for discrete imaging optics. In Fig. 4 of the present application, focusing lens 70 is designated as discrete imaging optics. For the improvement of the fiber laser system, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide a focusing lens to collect output light beams from the pump sources to the fibers.

With respect to claims 7 and 53, Corcoran discloses the pump sources are edge coupled.

With respect to claim 19, as discussed above, Corcoran discloses a collimating lens 26 and apertures 18a-18n. Corcoran further discloses optional collimating lens to further reduce the focal length (paragraph 0046).

With respect to claim 20, Corcoran discloses the claimed invention except for the beam-flattening optics being characterized by hexagonal geometry. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the beam flattening optics in hexagonal geometry in order to collect the most light from the fiber bundle corresponding to the fibers in the bundle.

With respect to claim 23, Corcoran discloses the resonator cores are different in length (see fibers 14a-14n).

With respect to claim 24, see laser diode array 12a-12n for pump sources.

With respect to claims 25-27, using light pipe or clad end pumping with focusing lens to couple the pump source to the fiber is well known in the art.

With respect to claim 28, choosing a wavelengths of approximately 1.5 microns for the pump laser array only involves routine skill in the art.

4. Claims 16-17, 29, 31-40, 42-44 and 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran (US 20030063631) in view of Waarts et al. (US 5677920).

With respect to claims 16-17 and 44, Corcoran discloses the claimed invention except for explicitly teaching the integrated reflectors in the fiber laser resonators. Waarts discloses a fiber laser that includes distributed Bragg reflectors 140 and 141 as shown in Fig. 15. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide distributed Bragg reflectors as taught by Waarts to Corcoran because it is well known in the art to have distributed Bragg reflectors inside the fibers to create resonance.

With respect to claims 29 and 42, see the rejections of claims 1, 16-17, and 19.

Art Unit: 2828

With respect to claim 31, see the rejection of claim

With respect to claim 31, see the rejections of claims 2-3 and 13-15.

With respect to claim 32, it is well known in the art that a fiber cladding is dielectric and at least partially surrounding the cores.

With respect to claims 33-36, Corcoran discloses some of the resonator cores are different in length and some are approximately equal (see fibers 14a-14n).

With respect to claims 37-38, Corcoran discloses pump laser diodes 12a-12n for pumping said fiber laser oscillators.

With respect to claim 39, using pigtail couplers for coupling pump diodes to the fiber oscillators only involves routine skill in the art.

With respect to claim 40, Waarts further discloses in Fig. 10 discrete imaging optics 93 and 103.

With respect to claim 43, Corcoran discloses a feedback mirror 28 positioned adjacent to one of said collimating lens 26.

With respect to claim 44, Corcoran and Waarts disclose the claimed invention except for the beam-flattening optics being characterized by hexagonal geometry. It would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the beam flattening optics in hexagonal geometry in order to collect the most light from the fiber bundle corresponding to the fibers in the bundle.

With respect to claims 48-50, Corcoran discloses the output of the system is a single mode laser beam. The means for rejecting higher order modes is also considered as means for

Art Unit: 2828

reflecting a first portion of collimated energy back through an aperture 18 between collimating lenses (one optional lens is discussed in the rejection of claim 19).

5. Claims 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corcoran (US 20030063631) in view of Ueda et al. ("1kW CW output from fiber-embedded disk lasers"; Lasers and Electro-Optics, 2002. CLEO '02. Technical Digest Summaries of Papers Presented at the 2002 Page(s):CPDC4-1 – CPDC4-2 vol.2 Digital Object Identifier 10.1109/CLEO.2002.1034492.) Corcoran discloses the claimed invention except for teaching a container substantially flat disk, plate, spherical, cylindrical accommodating said resonator cores, said container internally reflecting said input electromagnetic energy to facilitate coupling of said input electromagnetic energy with said fiber cores. Ueda discloses, "In a case of circulation pumping we inject the laser diode power from the ribbon fibers fabricated to the fiber disk active area as shown in Fig.2. In this scheme the whole pumping power should be absorbed in the core area without big loss because the pumping power is confined in the fiber disk" (Page 1 Paragraph 2). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a disk container having different shapes with multiple pump sources so that the whole pumping power can be absorbed in the core area without big loss.

Art Unit: 2828

Communication Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



/Phillip Nguyen/

AU 2828